REMARKS/ARGUMENTS

Claims 61, 72, 81, 90, 91 and 98 are amended. Claims 61-101 remain pending in the application. No new matter is added by the amended claims.

The Examiner's Rejection:

The Examiner rejected all of the pending independent claims: 61, 72, 81, 90, 91, and 98, along with dependent claims 63, 65, 67, 69-71, 73, 77, 79-80, 82, 86, 87, 89, 92, 94-95, and 99-101 under 35 U.S.C. 103(a) as being unpatentable over Takeo (USPN 4,721,630) in view of Yamamoto (USPN 5,240,745) and either or both of Nuber (DE 101 19 906 A1) and/or Pearce (USPN 4,781,517).

The Examiner states that as to claim 72, Takeo discloses a modular apparatus for performing a process on an object having an upper surface and sides conveyed to and from a location, comprising a pair of frame rails (item 11, Fig. 1) extending on opposite sides of a location and generally parallel to a path of conveyance of an object through the location, at least one robot arm (item 5) mounted on an associated one of each of the frame rail, and a tool mounted on each of said at least one robot arms for performing a process on the object whereby the at least one robot arms move the tools relative to the object enabling the tools to perform processes on the objects. The robot arms are movable along the frame rail and pivotable at a shoulder axis.

Takeo does not disclose that there are at least two legs attached to each of the frame rails for supporting the frame rails above a plane of an upper surface of the object at the location, and at least one cross support member fixedly connecting the frame rails together to form a rigid structure.

The Examiner relies on Yamamoto, especially with reference to Fig. 15, for disclosing that it is known to elevate painting robots by placing them on cross support members (item 572) on elevated frame rails (item 518) mounted on legs (items 94 and 38, Fig. 16). The cross support member connects the frame rails, forming a rigid structure with legs. One in the art would appreciate that elevated positioning would enable better coating of the roof of the car body, while still maintaining the capability of coating the sides of the car body. However, Yamamoto does not place the robots on the frame rails.

The Examiner relies on Pearce and Nuber for disclosing the concept of elevating a robot on frames, and placing a large portion of the robot underneath the frame.

The Examiner states that Pearce discloses a modular apparatus with robots being extendable below the frame rails for performing a process on an object conveyed to and from a location comprising a pair of frame members (Fig. 2) extending on opposite sides of a location and general parallel to a path of conveyance of an object through the location, at least two legs (items 13, 18, 19, and 20 in Fig. 2) attached to each of the frame rails for elevating the frame rails above a plane of an upper surface of the object at the location, at least one cross support member (item 23, Fig. 2) connecting the frame members together to form a rigid frame structure with the legs, at least one robot arm (items 71 and 114) mounted on an associated one of the frame members, and a tool mounted on the at least one robot arms for performing a process on the object whereby the at least one robot arms move the tools relative to the object enabling the tools to perform processes on the object. Pearce discloses, as shown in Fig. 2, that both frame rails are fixed as claimed.

The Examiner states that Nuber similarly discloses a frame or modular apparatus. Nuber's robot is specifically a paint spraying robot (items 13 and 14). The robot includes a fixed frame rail (item 15) and fixed cross beams (rack 12). Additionally, the robot is a six-axis robot and Fig. 3 shows that the robot has a shoulder, elbow, and wrist below the auxiliary axis and the racks. From the position of the joints in Fig. 3, both the shoulder and elbow permit movement only in a generally vertical plane.

The Examiner concludes by stating that placing the robots on the frame rails in opposed configuration as in Pearce would enable symmetrical process of a car body and better processing for coating reach of the car roof as in Yamamoto. Raising the frame as in Nuber and lowering the robot below this frame improves access to the top surface of the substrate, and in the automobile filed, would improve coating of the roof of the car. The cross support of both Pearce, Nuber and Yamamoto would reduce the possibility of collapse by improving structural support. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have utilized movable robots mounted on fixed elevated frame rails mounted on fix legs in order to provide better

coating reach of the car roof and to have utilized a cross support in order to provide structural support.

The Examiner further states that as to claim 61, Takco, as modified by Yamamoto and Pearce and applied to claim 1 (72?) above discusses the pair of frame rails mounted on opposite sides and extending generally parallel to the path of movement of the object (Takeo and Pearce), the frame rails being elevated above a plane of an upper surface of the object (Pearce and Yamamoto), the frame rails being connected together in a rigid frame structure (Pearce and Yamamoto), at least one robot arm mounted on an associated one of each of said frame rails (Takeo), and that the robot arm is movable along the associated frame rail (Takeo and Pearce), and that both frame rails cannot move relative to each other, and both frame rails do not move relative to said frame (Pearce). The Examiner stated that Takeo further discloses that each robot arm has at least two axes of motion for movement in a generally vertical plane transverse to the path of movement of the object (see column 6, lines 48-64), and these axes are considered to be shoulder and elbow axes, and Takeo also discloses that the tool is a paint applicator (bell type atomizers 5f) mounted on each of the at least one robot arms (items 51 and 52) and the arms move the paint applicators relative to the object while the paint applicators dispense paint to cover the upper surface and side surfaces of the object with paint.

As to Claim 81, the Examiner states that Yamamoto as incorporated discloses generic control means (Figures 14A, 14B, and 14C), which are capable of performing the claimed movements. Similarly, Nuber discloses that the shoulder and elbow permit movement only in a generally vertical plane from the position of the joints in Fig. 3. Pearce and Nuber suggest raising the frame rails. Additionally, the apparatus of Takeo is capable of performing the functions as claimed.

The Examiner states that Claims 90-95 and 97-101 are rejected based on the same rationale as independent claims 61, 72 and 81. With respect especially to independent claims 90 and 91, Takeo discloses first and second robot arms, and 6 axes of movement as well as rails on both sides. Yamamoto suggests raising them, and Pearce and Nuber suggest placing them on frames as claimed.

With respect to claim 98, Takeo discloses the frame rails, and the robot arms, and the paint applicator. Takeo utilizes rotational axis (swinging, pivoting, etc.) for the first

and second links (col. 6). Yamamoto suggests raising the robots, and Nuber and Pearce suggest fully elevating the robots.

Applicants' Response:

Applicants' novel invention comprises a modular robotic system developed ideally for facilities having floor space constraints. The modular system fits into existing booths, such as paint spray booths, thereby significantly reducing booth construction. The real beauty of the invention is that the modular configuration is truly modular, comprising a rail and at least one robot system inclusive of the controller, into a totally integrated system. The system is configured to the customer's desires, pre-tested and shipped. The customer can then place the configured system where desired. While the rail length may be customized, the system is simple, nonconfining, and adaptable. None of the cited prior art teaches such a simple system.

A further novelty of the modular system is the preferred placement of the rail with the entire robot system above the conveyor path. This allows a customer with limited space the opportunity to integrate an entire pre-tested, working robotic system providing full paint coverage with minimal floor space-or no floor space at all if the rails are located along a wall.

The modular system can be configured as a modular in-booth rail-where the rail forms a frame rail- or a clean wall rail, where both styles are preferably placed above and extending parallel to the conveyor path. As such, the modular system can comprise one or several robot systems mounted on one rail; a second rail having one or several robot systems mounted on the second rail; and additional framing members if needed. Applicants have included a copy of a company advertising brochure describing the novel invention for review by the Examiner. This information may also be found at www.fanucrobotics.com/file repository/fanucmain/P-200T.pdf.

Figure 6 of the present application illustrates a typical modular robotic system of the present invention wherein a customer orders a rail 14 having two robots 16. In this novel embodiment, the robot 16 includes the entire robot system – the mounting base 15, ribbon 18 and paint applicator 17. A modular unit corresponding to a customer order is formed and pre-tested. This pre-testing is only possible with Applicants' invention where

the entire robot system is preset and prewired on the rail (See Specification, page 3 lines 1-16). The system is unassembled and shipped to the customer. The modular unit is then re-assembled above a conveyor system. This novel modular system provides more flexibility in creating a customized system while providing flexible robot zones.

Takeo et al. teaches a well known prior art paint booth. Takeo et al. discloses a floor mounted robotic system. Takeo et al. is not motivated to provide an elevated rail system where Takeo et al. teaches and discloses that the novelty of the invention is that multiple robots are provided and capable of substituting for another robot if one is not working. The system of Takeo et al. takes up a tremendous amount of floor space.

Yamamoto et al. also teaches a well known prior art paint booth. Yamamoto et al. discloses a paint booth having the robot system located on the floor and the paint spray guns located alongside and overhead of the conveyor (Figure 15). Yamamoto et al. is not motivated to elevate the entire robot system onto an upper rail where the Yamamoto et al. controllers and paint system are located alongside the conveyor. The robot system of Yamamoto et al. also takes up a tremendous amount of floor space (Figure 1). It is the spray guns and not the robot system that is elevated in Figure 15. Applicants' respectfully disagree with the Examiner in that Yamamoto does NOT teach elevating painting ROBOTS by placing them on cross support members. Rather, Yamamoto teaches elevating painting spray guns that are controlled by floor level robots. Therefore, combining Yamamoto et al. with Takeo et al., as suggested by the Examiner, would provide overhead spray guns to Takeo's floor level system.

Pearce teaches a well known gantry system. Pearce teaches and claims multiple carriages for moving a robot in multiple directions. Pearce does not teach nor claim the simple modular apparatus of Applicants' novel invention. In Pearce, the gantry system supports the robot. Therefore, the carriages that form the gantry system provide the multiple axis movement for the robot. Pearce, then, is opposite of Applicants' novel system. Further, the teachings of Pearce are inapposite to modifying Takeo et al. to create Applicants' invention as suggest by the Examiner. Combining Pearce with Takeo et al. and Yamamoto et al. would provide multiple overhead carriages supporting either spray guns (Yamamoto et al.) or robots such as those shown in Pearce that are movable along multiple axes via the carriages along an axis perpendicular to the vehicle conveyor.

Alternatively, if you were to elevate the robots of Takeo et al. in accordance with Pearce, then at best you would still have a gantry system wherein the carriages move the robot overhead from one side of the vehicle to the other. Further, Pearce is not motivated to provide a system similar to Applicants' as the need for a gantry is then totally eliminated-more support for the novelty of Applicants' invention.

Nuber, like Takeo et al. and Yamamoto, teaches floor mounted robots. Therefore, Nuber does not add any new elements to the combined teachings of Takeo et al. with all of the above as suggested by the Examiner.

None of the prior art teaches or discloses the totally integrated modular system of Applicants' invention, as is now more clearly defined in independent claims 61, 72, 81, 90, 91, and 98. Combining Takeo et al. with Yamamoto and Pearce or Nuber, as suggested by the Examiner, will not urge an inventor to formulate Applicants' modular robotic system that is minimal, comprising only two parts, and totally integrated.

The remaining prior art cited by the Examiner in rejecting the dependent claims includes Thome, Cebola, Neikter, Josefsson, and Hohn. As previously set forth by Applicants, none of these patents teach or disclose the novel aspects of Applicants' invention.

Thome shows floor mounted painting robots connected to controllers.

Cebola shows a roof machine having paint sprayers connected to conduits and cables for coating product, air and electric current wherein the conduits and cables are housed in a beam carrying the sprayers.

Neikter shows painting "automatics" **5, 6** enclosed in flexible, gas-permeable material enclosures **12, 22**. The enclosures **12, 22** are pressurized such that part of the air flows out to repel paint particles.

Josefsson shows a paint spray booth for the application of powder paint from fixed applicators **104a, 104b, 214, 314**.

Hohn shows a robot with an adhesive material dispensing gun **120** mounted on a wrist **27** having three axes of motion.

None of these patents in combination with any or all of Takeo et al., Yamamoto, Pearce, and Nuber obviates Applicants' fully integrated, fully elevated modular robot system.

Conclusion

Applicants respectfully submit that independent claims 61, 72, 81, 90, 91, and 98, are allowable over the prior art of record. Remaining claims 62-71, 73-80, 82-89, 92-97, and 99-101 depend from these claims and are, therefore, also allowable.

The foregoing amendments are taken in the interest of expediting prosecution and there is no intention of surrendering any range of equivalents to which Applicants would otherwise be entitled in view of the prior art.

By amending the application, Applicants do not concede that the patent coverage available to them would not extend as far as the original claim. Rather, Applicants intend to file a continuation application to pursue the breadth of the claims as filed. Applicants believe that the Examiner has not made a sufficient showing of inherency of the teachings of the asserted prior art, especially given the lack of teachings in the cited references of the properties that Applicants have recited in their claims.

Further, by the present amendment, it does not follow that the amended claims have become so perfect in their description that no one could devise an equivalent. After amendment, as before, limitations in the ability to describe the present invention in language in the patent claims naturally prevent the Applicants from capturing every nuance of the invention or describing with complete precision the range of its novelty or every possible equivalent. See, Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co., 62 USPQ2d 1705 (2002). Accordingly, the foregoing amendments are made specifically in the interest of expediting prosecution and there is no intention of surrendering any range of equivalents to which Applicants would otherwise be entitled.

In view of Applicants' amendments and remarks, the Examiner's rejections are believed to be rendered moot. Accordingly, Applicants submit that the present application is in condition for allowance and requests that the Examiner pass the case to issue at the earliest convenience. Should the Examiner have any question or wish to further discuss this application, Applicants request that the Examiner contact the undersigned at (248) 960-2100.

If for some reason Applicants have not requested a sufficient extension and/or have not paid a sufficient fee for this response and/or for the extension necessary to

prevent the abandonment of this application, please consider this as a request for an extension for the required time period and/or authorization to charge our Deposit Account No. 50-3156 for any fee which may be due.

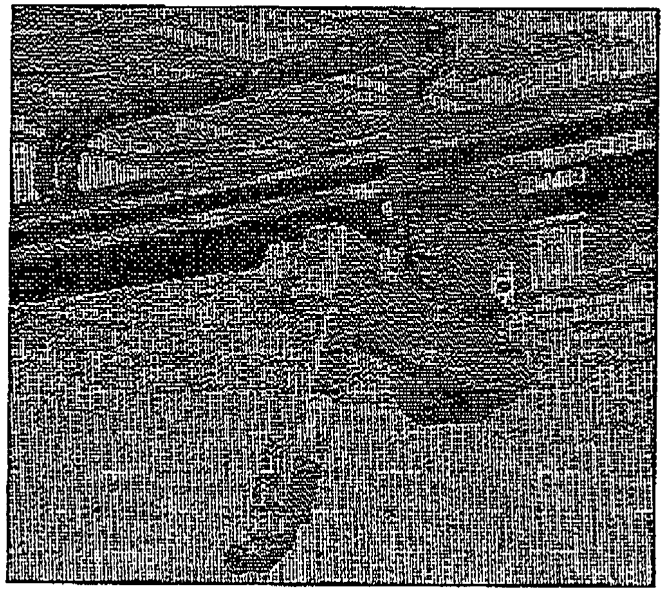
P-200T™

Basic Description

FANUC Robotics' P-200T overhead rail-mounted paint robot integrates the industry's most advanced process equipment to enhance application of paint, gelcoat and chopped fiberglass. The P-200T is a six-axis, modular construction, electric servo-driven robot, designed for painting and fiberglass reinforced plastic (FRP) industries. A feasible replacement for manual sprayers, the P-200T robot provides an overhead reach that gives process flexibility to maintain target distances over large parts.

Process Advantages

- Robotic spraying meets and exceeds the criteria for controlled spraying.
- Consistent trigger on timing yields consistent film build, providing an improved finish appearance.
- Maximized trigger accuracy and repeatability through in-arm trigger valve for fast gun on/off response time.
- Reduced material waste.
- Higher film build consistency.
- Easy installation alignment minimizes integration costs.
- Heavy payload (15kg at wrist, 15kg in outer arm) carries current applicators with flexibility for future applicator technology to provide a longer lasting paint shop solution.
- WinTPE is a user-friendly Windows-based, graphical programming interface for viewing, editing and teaching positions in Teach Pendant Programs (optional).



Motion Control Advantages

- Extremely fast acceleration and deceleration motions increase spraying time allowing more area to be covered by the same robot.
- Constant application speed yields consistent film build, providing improved finish appearance.

System Advantages

- Modular length rails can be attached to free-standing, modular support legs

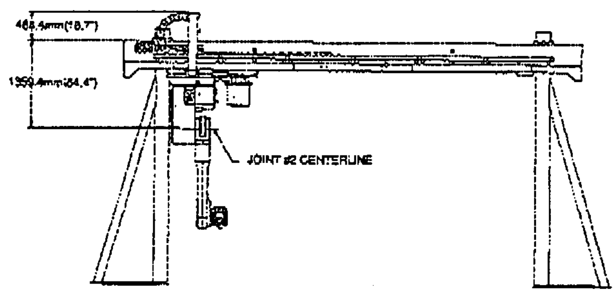
Reliability and Maintenance Advantages

- Cast aluminum gear boxes contain sealed lubrication that increases reliability and decreases maintenance cost.
- Patented, hollow, sealed wrist and patented purge system for operation in hazardous environments protect motors and cables from painting environment and are approved for Class I and II, Div. 1, Groups C,D,E,F,G environments.
- Utilizes P-200 existing technology found in automotive final assembly paint shops.

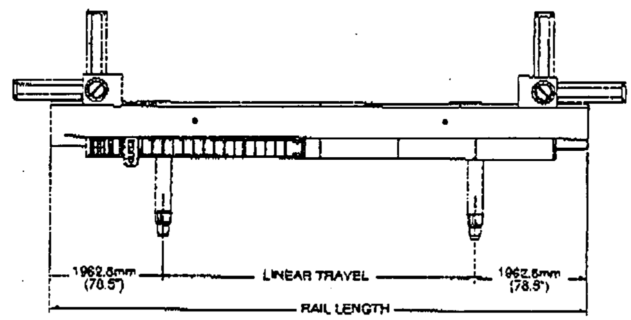
FRP Capabilities

- Helps reduce styrene emissions and improve bottom line results for customers.
- User-friendly AccuChop closed loop fluid delivery system automatically calculates flow rates, providing consistent paint delivery and high finish quality (optional).
- Robot designed for fiber-glass reinforced plastic applications in the boat industry.
- FANUC Robotics has extensive experience within the fiberglass open mold forming market.

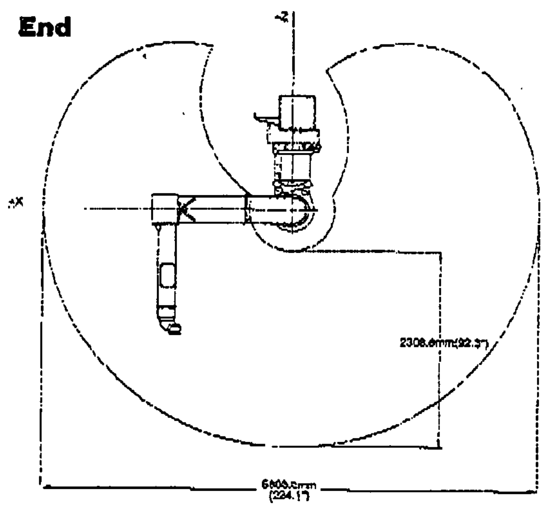
Side



Top



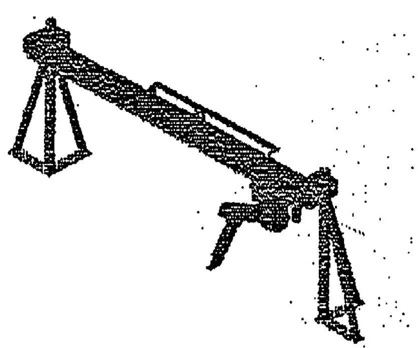
End



P-200T Specifications

Items			
Motion Range and Speed	Axis 1	7.5 meter travel (various)	1100 mm/sec
	Axis 2	+/- 115°	119° /sec
	Axis 3	+/- 160°	150° /sec
	Axis 4	+/- 180°	375° /sec
	Axis 5	+/- 180°	428° /sec
	Axis 6	+/- 180°	364° /sec
Coating speed	1000 mm/sec		
Wrist payload[A]	15kg		
Outer arm payload[B]	15kg		
Repeatability	+/- 1mm		
Mechanical brakes	Axis 2, 3, 4, 5		
Certification	FM Class I, II, III/Div I, II		
Environment	0-45° C ambient temperature		

Note:
A) At 300mm radial 50mm axial offset
B) Mounted inside outer arm



Note: Dimensions are shown in millimeters.
Detailed CAD data are available upon request.

FANUC Robotics America, Inc.
3900 W. Hamlin Road
Rochester Hills, MI 48309-3253
(248) 377-7000
Fax (248) 377-7362

For sales or technical information, call:
1-800-47-ROBOT

marketing@fanucrobotics.com
www.fanucrobotics.com

Charlotte, NC
(704) 596-5121

Chicago, IL
(847) 898-6000

Cincinnati, OH
(513) 754-2400

Los Angeles, CA
(949) 595-2700

Toledo, OH
(419) 866-0788

Toronto, Canada
(905) 812-2300

Montréal, Canada
(450) 492-9001

Aguascalientes, Mexico
52 (449) 922-8000

Sao Paulo, Brazil
(55) (11) 3619-0599